

1 **TITLE**

2 **SHOCK ABSORBING SHOE**

3 **BACKGROUND OF THE INVENTION**

4 **1. Field of the Invention**

5 [0001] The present invention relates to a shoe, and more particularly, to a shock absorbing shoe
6 which is able to absorb shocks applied to the foot of a wearer while walking or running.

7 **2. Description of the Related Art**

8 [0002] A shoe is typically constructed of an upper member that protects the instep and ankle and
9 a sole that protects the sole of a foot, improves walking and traveling abilities with an increased
10 friction force to the ground and performs an absorbing action, the upper member being connected
11 to the sole.

12 [0003] In order to absorb shocks upon contacting to the ground through the above-mentioned sole,
13 widely employed are air bags which have the sole made of a material with a superior expansion and
14 contraction, i.e., a superior buffering ability, or which have the buffering function on the sole.

15 [0004] However, in a case that the sole entirely made of a material with a superior buffering ability
16 is used, it adds consumers' economic burden due to a cost increase. Especially, abrasion is easily
17 occurred upon friction caused by a contact to the ground, this disables a long time wearing.

18 [0005] Additionally, in case of employing the air bag, it has an advantage that the sole can be
19 made of a material strong to abrasion. On the other hand, it is problematic in that the air bag is torn

1 by a sharp object to thus run off air and resultantly can exhibit no buffering effect at all.
2 [0006] Moreover, noises are generated from a torn part of the air bag whenever walking, this can
3 make the user feel unpleasant.

4 **SUMMARY OF THE INVENTION**

5 [0007] The present invention has been developed for the purpose of solving the foregoing
6 problems and thus it is an object of the present invention to provide a shock absorbing shoe which
7 absorbs shocks generated upon walking to the maximum by inserting a shock absorbing member
8 with a rectangular cross sectional coil spring into the forefoot and heel portions of the sole of a foot
9 and which allows walking and running without strain by a repulsive force of the spring.

10 [0008] To achieve the above object, there is provided a shock absorbing shoe according to one
11 aspect of the present invention, comprising: an upper member which wraps and protects the instep
12 and ankle; a cushion member which is sutured to the upper member, improves a frictional force
13 between the sole of a foot and the ground, and consists of a forefoot portion and a heel portion each
14 having a recess of a predetermined depth; a buffering unit which is arranged in the respective
15 recesses of the forefoot and heel portions of the cushion member for absorbing shocks while the
16 wearer is walking or running; an air pumping unit which is arranged in the recess of the heel portion
17 to perform an auxiliary buffering action and which supplies air onto the forefoot portion; and a
18 bottom sole which is mounted on the upper part of the cushion member and to which the foot sole
19 of the user is tightly attached.

20 [0009] There is provided a shock absorbing shoe according to another aspect of the present

1 invention, comprising: upper and lower caps which are symmetrical to each other and have a
2 plurality of annular flanges projected, the annular flanges having insert grooves on the inside
3 surfaces facing each other; and coil springs which integrally connects the upper and lower caps with
4 both opposite ends being forcedly inserted into annular flange insert grooves of the upper and lower
5 caps and have a predetermined elastic force.

6 [0010] There is provided a shock absorbing shoe according to still another aspect of the present
7 invention, which has a sole attached to the bottom portion of the shoe for protecting the foot sole and
8 forming a friction with the ground, comprising: a cushion member which has an upper of the shoe
9 attached thereto to form the shape of the shoe and a recess of a predetermined shape provided on the
10 bottom surface; a friction member which is attached to the bottom surface of the cushion member
11 for forming a friction with the ground; and a shock absorbing member which is arranged in the recess
12 and has a predetermined recess formed between the cushion member and the friction member and
13 several rectangular cross sectional coil springs elastically mounted between fixed caps.

14 **BRIEF DESCRIPTION OF THE DRAWINGS**

15 [0011] These and other features, aspects, and advantages of preferred embodiments of the present
16 invention will be more fully described in the following detailed description, taken accompanying
17 drawings. In the drawings:

18 [0012] Figs. 1 to 3 are explanatory views showing a shock absorbing shoe according to a first
19 embodiment of the present invention;

- 1 [0013] Figs. 4 to 6 are explanatory views showing a shock absorbing shoe according to a second
2 embodiment of the present invention; and
3 [0014] Figs. 7 to 9 are explanatory views showing a shock absorbing shoe according to a third
4 embodiment of the present invention.

5 **DESCRIPTION OF THE PREFERRED EMBODIMENT**

6 [0015] A characteristic construction and the corresponding operational effects of the present
7 invention will also become apparent from the detail description of the preferred embodiments
8 referring to the accompanying drawings that follow.

9 [0016] Figs. 1 to 3 are explanatory views showing a shock absorbing shoe according to a first
10 embodiment of the present invention. Figs. 4 to 6 are explanatory views showing a shock absorbing
11 shoe according to a second embodiment of the present invention. Figs. 7 to 9 are explanatory views
12 showing a shock absorbing shoe according to a third embodiment of the present invention.

13 [0017] Firstly, as shown in Figs. 1 to 3, the shock-absorbing shoe according to the first
14 embodiment of the present invention will be described as follows.

15 [0018] As shown therein, the shock-absorbing shoe is roughly divided into an upper member 100,
16 a cushion member 110, a buffering unit 120, an air pumping unit 130 and a bottom sole 140.

17 [0019] The upper member 100 is the region wrapping and protecting the instep and ankle, and is
18 typically formed of a fabric or leather.

19 [0020] The cushion member 110 is integrally formed with the upper member 100 by suturing and
20 carries out the function of improving a frictional force between the sole of a foot and the ground.

1 [0021] On a forefoot portion 111 and a heel portion 112 of the cushion member 110, recesses 113
2 and 114 of a predetermined depth are formed respectively.

3 [0022] To the heel portion 112 of the cushion member 110, a projecting cushion 115 projecting
4 relatively further than peripheral portions is integrally provided. The projecting cushion 115 is
5 provided to the heel portion 112, which is the portion where largest shock is applied upon walking
6 or running, in order to avoid a wearer from feeling by its foot the parts of the buffering unit 120 to
7 be described later upon walking or running so that the wearer does not feel uncomfortable.

8 [0023] The buffering unit 120 is provided on the recesses 113 and 114 respectively that are
9 prepared on the forefoot portion 111 and heel portion 112 of the cushion member 110. They carry
10 out the function of absorbing shocks while the wearer is walking or running.

11 [0024] In a detailed structure of this buffering unit 120, upper and lower caps 121 and 122 having
12 a symmetrical shape to each other are located spaced at a predetermined interval on each of the
13 recesses 113 and 114, and annular flanges 123 and 124 of a predetermined height are projected on
14 these upper and lower caps 121 and 122 in a direction opposite to each other.

15 [0025] On the annular flanges 123 and 124, insert grooves 125 and 126 are formed at a
16 predetermined depth.

17 [0026] Into the insert grooves 125 and 126 of the annular flanges 123 and 124, both opposite ends
18 of coil springs 127 are forcedly inserted and fixed. By this forced insertion and fixing of the coil
19 springs 127, the upper and lower caps 121 and 122 as well as the coil springs 127 are integrally
20 connected to form one assembly.

21 [0027] Preferably, the coil springs 127 are the ones that are excellent in elastic force and are not

1 easily elastically deformed even by a long time, repetitive shock.

2 [0028] The air pumping unit 130 is provided at the recess 114 formed on the heel portion 112 of
3 the cushion member 110 and carries out an auxiliary buffering function along with the
4 above-described buffering unit 120, especially, the function of supplying air to the sole of the
5 wearer's foot by supplying air to the forefoot portion 111.

6 [0029] In a detailed structure of this air pumping unit 130, on the recess 114 of the heel portion
7 112, an air pump 131 blasting air as being compressed by a shock from the upside, that is, a shock
8 applied while the wearer is walking or running, is located approximately on the center between the
9 coil springs 127.

10 [0030] Additionally, an air supply pipe 132 is prepared on at least one location for guiding the air
11 blasted from the air pump 131 to the recess 113 of the forefoot portion 111.

12 [0031] Preferably, the air supply pipe 132 is formed by forming a guide groove 133 on the upper
13 surface of the cushion member 110 to a predetermined depth. But the present invention does not
14 limited thereto and it is also possible to form the air supply pipe 132 as a separate part.

15 [0032] In order to supply air to the foot of the wearer in a state that air is guided to the recess 113
16 of the forefoot portion 111 via the air supply pipe 132, a plurality of through holes 141 are formed
17 on the bottom sole 140 corresponding to the forefoot portion 111.

18 [0033] The shock-absorbing shoe thus constructed according to the present invention can acquire
19 the shock absorbing effect as shocks applied to the foot sole while the wearer is walking or running
20 are buffered by the buffering unit 120, i.e., the coil springs 127, prepared at the recesses 113 and 114
21 of the cushion member 110.

1 [0034] In other words, the effect of buffering the shocks applied upon walking or running is
2 exhibited as the coil springs 127 are compressed, thereby preventing the foot of the wearer from
3 getting strains applied thereto.

4 [0035] In addition thereto, since the air pumping unit 130 is provided on the recess 114 formed
5 on the heel portion 112 of the cushion member 110, that is, since there is provide the air pump 131
6 that exhibits the buffering effect by blasting air while compressed when a shock is applied, a more
7 effective buffering effect can be acquired.

8 [0036] Furthermore, the air compressed upon operation of the air pumping unit 130 is guided to
9 the recess 113 of the forefoot portion 111 via the air supply pipe 132 and simultaneously introduced
10 into the shoe via the through holes 141 formed on the bottom sole 140 at the position corresponding
11 to the forefoot portion 111. By this, the foot of the wearer can be cooled down and the generation
12 of sweat caused by a long time wearing can be prevented.

13 [0037] Next, as shown in Figs. 4 to 6, the shock absorbing shoe according to the second
14 embodiment of the present invention will be described.

15 [0038] As shown therein, the shock absorbing shoe is roughly divided into an upper cap 210, a
16 lower cap 220 and coil springs 230.

17 [0039] The upper and lower caps 210 and 220 are symmetrical to each other, especially, have
18 annular flanges 211 and 221 of a predetermined diameter formed projected from the facing inside
19 surfaces so as to face each other. On these annular flanges 211 and 221, insert grooves 211a and
20 221a are formed at a predetermined depth.

21 [0040] The coil springs 230 are arranged between the upper and lower caps 210 and 220 to exhibit

1 an actual buffering effect. Both opposite ends thereof are forcedly inserted into the insert grooves
2 211a and 221a of the annular flanges 211 and 221, thereby additionally carrying out the function of
3 integrally connecting the upper and lower caps 210 and 220.

4 [0041] In other words, the upper and lower caps 210 and 220 and the coil springs 230 are
5 integrally connected directly via the coil springs 230 to form one assembly.

6 [0042] The coil springs 230 of such a type may be ones having a circular cross sectional shape,
7 more preferably, rectangular cross sectional coil springs 230 which are less deformable and are
8 highly elastic.

9 [0043] Between the upper and lower caps 210 and 220, there is generated an unnecessary space
10 region except the regions where the coil spring 230 is mounted.

11 [0044] When such a space region is generated, there is a possibility that noises occurring upon a
12 buffering action through the coil springs 230 are emitted to the outside. Thus, in order to prevent this
13 emission and double the buffering effect along with the coil springs 230, it is preferable that an
14 auxiliary buffering body 240 is sandwiched between the upper and lower caps 210 and 220 so that
15 it can become adjacent to the coil springs 230.

16 [0045] Preferably, the auxiliary buffering body 240 is formed of a material having an elastic force,
17 that is, a rubber or sponge.

18 [0046] In the shock absorbing shoe of this invention, in a state that the coil springs 230 are
19 sandwiched between the upper and lower caps 210 and 220 simultaneously with the auxiliary
20 buffering body 240 being sandwiched therebetween, that is, in a state that one assembly is formed,
21 the assembly is positioned on the recess 113 formed on the forefoot portion 111 and heel portion 112

1 of the bottom surface of the cushion member 110.

2 [0047] According to its purpose of use, the auxiliary buffering body 240 may be selectively
3 sandwiched between the forefoot portion 111 and the heel portion 112.

4 [0048] Consequently, as the coil springs 230 and the auxiliary buffering body 240 carry out a
5 buffering action while the user is walking or running, a burden caused by a shock applied to the
6 user's foot can be alleviated.

7 [0049] Since the coil springs 230 sandwiched between the upper and lower caps 210 and 220 are
8 forcedly inserted into the insert grooves 211a and 221a formed on the annular flanges 211 and 221
9 of the upper and lower caps 210 and 220, it is possible to prevent the coil springs 230 from falling
10 off as well as the upper and lower caps 210 and 220.

11 [0050] That is to say, it is made possible to maintain a mutual firm assembly state.

12 [0051] Meanwhile, because the auxiliary buffering body 240 sandwiched between the upper and
13 lower caps 210 and 220 carries out the buffering action along with the coil springs 230, the buffering
14 effect can be doubled. Further, the auxiliary buffering body 240 exhibits the effect of blocking the
15 space region between the upper and lower caps 210 and 220, thereby preventing a noise generating
16 from the coil springs 230 from being emitted to the outside.

17 [0052] Next, referring to Figs. 7 to 9, the shock absorbing shoe according to the third embodiment
18 of the present invention will be described.

19 [0053] As shown therein, the shock absorbing shoe 300 is comprised of an upper member 310
20 wrapping and protecting the instep and ankle and a cushion member 320 increasing a frictional force
21 between the sole of a foot and the ground upon walking.

1 [0054] The cushion member 320 is provided with an inner sole which is placed on the surface of
2 the cushion member, which is compressively bonded to the upper member 310 with a bond or
3 coupled thereto by sewing so as to absorb shocks and achieve a stable coupling state and which
4 offers wearing stability, air permeability and absorptivity, but a detailed description and illustration
5 therefore will be omitted.

6 [0055] And, the cushion member 320 has a recess 324 of a predetermined shape concavely formed
7 on the forefoot portion 321 and heel portion 322 of the bottom surface thereof. The heel portion 322
8 is pierced to form through holes penetrating the recess 324 from the sides.

9 [0056] Into the recess 324, a shock absorbing member 340 having the same shape and height as
10 the recess is inserted and fixed. In the shock absorbing member 340, fixed caps 343 are covered onto
11 the upper and lower parts of rectangular cross sectional coil springs 346, a wire 344 passes through
12 the center of the fixed caps 343 and both ends of the wire 344 are fixed to the fixed caps 343 by
13 welding or riveting. At this time, the rectangular cross sectional coil springs 346 are compressed to
14 a predetermined state and fixed so that it can hold an elastic force suitable for absorbing and
15 alleviating shocks generated from the sole of a shoe during walking or running.

16 [0057] At the center of the fixed caps 343 fixing the wire 344 passing through the center of the
17 rectangular cross sectional coil springs 346, mounting grooves 342 for fixing the wire 344 are
18 formed concave so that the fixed end of the wire 344 cannot be projected to the outside.

19 [0058] A compression state of the rectangular cross sectional coil springs 346 mounted between
20 the fixed caps 343 is differently set according to whether they are mounted on the heel portion 322
21 or on the forefoot portion 321. It means that the fixed caps 343 are arranged on a fixed plate 341

1 having the same shape as the recess 324 formed on the bottom of the cushion member 320, taking
2 a shock distribution generated by a human body during walking or running into account.

3 [0059] Another fixed plate 341 is placed above the fixed caps 343 mounted on the fixed plate 341.
4 In this state, several fixed caps 343 are welded or inserted into fixed protuberances projected from
5 the fixed plates so that they cannot move between the fixed plates 341.

6 [0060] With the shock absorbing member 340 of the above construction being inserted and fixed
7 into the recess 324 of the cushion member 320, a friction member 330 made of rubber with high
8 elasticity is attached to the bottom surface of the cushion member 320 and shock absorbing member
9 340 to achieve a friction to the ground. Being inserted and fixed into the recess 324 of the cushion
10 member 320.

11 [0061] Further, a cushion material of a transparent type is inserted into a the through hole
12 perforated in the heel region of the cushion member 320, to thus form a transparent window portion
13 323 capable of confirming the shock absorbing member 340 mounted in the recess 324.

14 [0062] In the shock absorbing shoe thus constructed of this invention, the heel portion 322 is
15 firstly contacted to the ground upon walking or running, then the foot sole is contacted, and then the
16 forefoot portion 321 is contacted. When the heel portion 322 is contacted, the shock absorbing
17 member 340 absorbs shocks concentrated on the heel portion 322 as shown in Fig. 4. That is, shocks
18 applied to a certain compressed rectangular cross sectional coil springs 346 are firstly absorbed.
19 Shocks exceeding a compression state are secondly absorbed as the rectangular cross sectional coil
20 springs 346 are further compressed.

21 [0063] In other words, as illustrated in Fig. 4, a concentrated load passing through the cushion

1 member 320 is firstly transferred to the fixed plate 341 via the heel portion 322, and the concentrated
2 load transferred to the fixed plate 341 is dispersed to the rectangular cross sectional coil springs 346
3 via the fixed caps 343 arranged and fixed at their respective position of the fixed plate 341. Next,
4 the dispersed load is firstly absorbed in the rectangular cross sectional coil springs 346 that is
5 mounted in a compressed state, and shocks exceeding the compressed state are transferred to the
6 rectangular cross sectional coil springs 346. At this time, the second compression of the compressed
7 rectangular cross sectional coil springs 346 is performed onto the rectangular cross sectional coil
8 springs 346 over the heel portion 322, thereby allowing all of the springs to absorb the dispersed and
9 transferred load.

10 [0064] Hence, the concentrated load generated upon contacting the heel portion 322 onto the
11 ground is dispersed and transferred to each of the rectangular cross sectional coil springs 346 in the
12 process of transferring to the shock absorbing member 340 of this invention. By this, each of the
13 rectangular cross sectional coil springs 346 receives a load of a dispersed state and compensates the
14 shock caused by the dispersed load with a stress against the load, thereby drastically reducing the
15 shock transferred to the heel and knee joints of the user.

16 [0065] And, according to a moving state of the foot, when the user is moving by the foot sole and
17 the forefoot portion 321, the shock absorbing member 340 mounted to the forefoot portion 321 in
18 a first compression state is secondly compressed with a concentrated load. And, the rectangular cross
19 sectional coil springs 346 of the shock absorbing member 340 located in the heel portion 322 forms
20 a repulsive force to provide elasticity to the user's foot.

21 [0066] The rectangular cross sectional coil springs 346 of the shock absorbing member 340, which

1 are compressed in the forefoot portion 321 by a continuous movement of the foot, transfers to the
2 user a repulsive force corresponding to the compression state as soon as the foot is released from the
3 ground. Thus, while the user is walking or running, the shock caused by its weight is absorbed in the
4 shoe 300. Besides, the repulsive force corresponding to the elasticity for compression is transferred
5 to the foot, thereby enabling the user to walk or run without strain.

6 [0067] The rectangular cross sectional coil springs 346 contracting and repulsing in the shock
7 absorbing member 340 as seen from above are mounted between the fixed caps 343 and around the
8 wire 344. In this state, since the fixed caps 343 are located on the fixed plate 341 in a fixed state, a
9 concentrated load is transferred via the fixed plate 341 made of a high surface strength material when
10 the heel portion 322 is contacted to the ground, thereby achieving a stable compressing action.
11 Moreover, since the rectangular cross sectional coil springs 346 have a cross section of a flat,
12 rectangular shape, whatever direction the concentrated load may be applied from, the rectangular
13 cross sectional coil springs 346 achieve a stable compression state by means of the fixed plate 341.

14 [0068] Furthermore, since the installation state of the shock absorbing member 340 and the elastic
15 state of the rectangular cross sectional coil springs 346 can be visually confirmed through the
16 transparent window portion 323 formed on the heel portion 322 of the cushion member 320, this
17 improves the user's certainty of the functionality.

18 [0069] As seen from above, according to the shock absorbing shoe according to the present
19 invention, a mutual complementary buffering effect is exhibited by the coil springs and the auxiliary
20 buffering body and so on, thus doubling the shock absorbing effect.

21 [0070] Therefore, there is no strain given to the knee or joints of the user, so the convenience of

1 use and marketability can be enhanced.